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THE OPERATIONAL COMMANDER AND THE TRIDENT SSGN

by

Paul E. Savage
LCDR, USN

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: _____

Paul Savage

5 February 1999

Advisor: _____

E.W. Wildemann

E.W. Wildemann

CDR, USN

Joint Military Operations Dept.

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Abstract

The first four Trident SSBN submarines have been proposed for conversion into conventional missile platforms, or SSGNs, and may arrive in the fleet as soon as 2005. Carrying an arsenal of land-attack weapons, the SSGN will provide the warfighting CINC with a platform that can arrive in the area of a regional conflict undetected, and far in advance of other more vulnerable assets. As a formidable theater asset, the SSGN operational strengths and weaknesses must be addressed by the Department of Defense. Further, the operational concept for this platform must be developed and practiced in order to realize the SSGN's full potential.

From the operational commander's perspective, the SSGN will provide operational functions unlike any previous submarine. The SSGN will be tasked to shape the battlefield using operational fires, and also provide tactical support to land forces. However, the current submarine command and control organization is not structured to support this theater asset. This paper will prove that the operational commander will be able to overcome command, control and communications difficulties to truly integrate the SSGN within the joint warfighting arena. The commander will surmount these difficulties through revisions to organizational structure and current doctrine, and the expanded use of current communications technology.

Doctrine must change to allow a non-afloat commander to take control of the SSGN. Further, submarine liaison officers should be assigned to the operational commander's staff during conflicts in which the SSGN may be employed. OPNAV, in conjunction with the Naval Warfare Doctrine Command, must sponsor war games to develop the operational concept of the SSGN. Finally, the CINC's must incorporate the SSGN into Fleet Battle Experiments and other exercises to test this new doctrine.

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Background

As the US prepares to enter the next century, the armed forces continue to emphasize the expeditionary role of the naval forces. Political reasons may compel our allies or coalition partners to deny access to forward bases during future conflicts. Therefore, particular attention should focus on projecting power into regions where no military facilities will be available. Further, if the adversary is able to deny access to a region and "hold our forces at arm's length," the naval ability to support the deep battle becomes arduous and complex.¹ It is in these situations that the stealth of the submarine, combined with the strike capability of a ship carrying hundreds of land-attack missiles, will allow the operational commander to gain access and project power inland.

Development of an arsenal ship that would carry hundreds of strike missiles gained momentum in the early 1990's with the firm backing of ADM Boorda as the Chief of Naval Operations.² "The idea behind the arsenal ship was to minimize both costs and manning requirements by focusing solely on the land-attack mission and offloading such ancillary missions as air defense and reconnaissance to other platforms."³ However, lack of self-defense capability and mission flexibility jeopardized further development of the arsenal ship. The skeptics on congressional budget panels were unable to overlook those conceptual flaws when they suspended funding for its continued development.⁴

The requirement to provide the operational commander with more land-attack missiles still exists as the Navy searches for platforms that will meet the needs of the next century.

¹ Tomas G. Mahnken, "Deny the U.S. Access?" U.S. Naval Institute Proceedings, September 1998, 37.

² Joseph M Lance Major, USMC, Can the Arsenal Ship Replace the Battleship? (Leavenworth, KS: US Army Command and General Staff College, 9 December 1996), 26.

³ Merrick Carey, "Trident Conversion wins NDP Support" U.S. Navy League SEAPOW, February 1998, 41.

Fleet exercises, such as 'The Ring of Fire,' have proven how quickly the commander is able to expend all the land-attack missiles in a task group. The result of the second of these experiments specifically stated that "ships ran out of weapons before the session ended."⁵ Operation Desert Fox, in which more than 200 land-attack missiles were launched against Iraq during the first day, supports this sobering fact.

Future joint warfighting platforms must also counter asymmetric strategies that may weaken American resolve, deny access to forward bases, or deny air superiority in the early stages of entry. Hence, the National Defense Panel stated that the Navy should "look closely at converting one or more of the Trident SSBN's coming out of strategic service to alternative missions."⁶

The Navy's current plan is to have the vessels carry a mix of Tomahawk cruise missiles and the shorter range, but faster, Naval Tactical Missile System (NTACMS). The NTACMS will be the Navy version of the Army ATACMS, a 100-km tactical missile. Also discussed for inclusion in the conversion is the modification of two of the 24 inter-continental ballistic missile (ICBM) tubes for special force operations. These tubes would allow delivery of Special Forces or dock the new Advanced SEAL Delivery Submarine (ASDS).⁷

The whole conversion project is dependent upon the ratification of the START II treaty. Converting the four Tridents would reduce the number of nuclear submarine ICBM tubes below START I levels, an action that the US will not unilaterally pursue. However, the

⁴ "DEF-08 Terminate the Arsenal Ship Program"

<http://www.fas.org/man/congress/1997//cbo_deficit/def08.htm> (10 Jan 1999).

⁵ David Blake and others, Fleet Battle Experiment Bravo – Ring of Fire Analysis Report (U) (Alexandria, Va: Center of Naval Analyses, January 1998), 2.

⁶ "Nation Defense Panel Report" December 1997, quoted in Carey, 42.

⁷ Merrick Carey and Loren Thompson, "Defense Panel Pushes Trident Conversion" Naval Submarine League The Submarine Review, January 1998, 22.

US Congress has already ratified the START II treaty, which now awaits the Russian Duma's approval.

The converted submarines will be "ideal platforms for joint force experimentation – that is, testing new ideas and systems for the future."⁸ The transformation will not only change the Trident submarine, but also holds the potential to alter future methods of joint forces power projection. The SSGN is "conceived to be part of a broader network of joint forces" with capabilities that "perform a wider range of missions than any other warship in history."⁹ The operational concept for this asset must be developed and practiced now to realize the SSGN's full potential in a joint theater role.

Because of its unique capabilities, the SSGN will undoubtedly become a vital theater asset to the operational commander. This paper will prove that the operational commander will be able to overcome command, control and communications difficulties to truly integrate the SSGN within the joint warfighting arena. The commander will surmount these difficulties through revisions to organizational structure and current doctrine, and the expanded use of current communications technology.

Functions and Missions

The SSGN provides the Navy with a unique platform able to operate at all levels of war. Because of the operational functions it will accomplish, the SSGN will be a theater asset.¹⁰ The primary function the SSGN will provide the operational commander is that of operational fires. Envisioned to carry 168 land-attack missiles that are able to reach nearly

⁸ John K. Welch, "Three Issues of Importance to the Submarine Force" Naval Submarine League The Submarine Review, January 1998, 34.

⁹ Carey, "Trident Conversion Wins NDP Support" 42.

85% of the world's landmass, the operational commander will assign the SSGN to deliver an operational fire salvo on par with an entire CVBG.¹¹ When tasked to project power ashore, the SSGN will be able to control and shape the battlefield during the early stages of conflict. Supplying the first round of operational fires, this attack will suppress enemy defenses, allowing the safer entry of more vulnerable surface and air forces.

The other operational functions to consider are force protection and logistics. Virtually undetectable, the SSGN will patrol off the shores of troubled regions. Protected by the environment from visual and radar detection, and extremely difficult to detect by sonar, the SSGN will not require other forces from the Joint Task Force (JTF) to protect its valuable cargo of missiles. Designed to operate autonomously on patrol, the SSGN will reduce operational logistics requirements. The patrol duration will be limited only by the amount of food and missiles carried onboard. Further, by expending the SSGN's missiles, the operational commander preserves the land-attack missiles of the rest of the JTF for follow-on actions. Another option open to the commander will be to allocate even more anti-air or theater ballistic missile defense weapons to the rest of the task force, relying more on the SSGN to provide the land-attack mission.

The SSGN could also be tasked to provide fire support. To support the Marines' new Operational Maneuver from the Sea concept, as well as other joint or coalition land forces, the missile load must include the NTACMS. Tailoring the missile load by theater must occur

¹⁰ "Forward...From Under the Sea" <<http://www.chinfo.navy.mil/navpalib/cno/n87usw/autumn98/forward.htm>> (15 Jan 1999).

¹¹ Charles C. Swicker, CDR, USN. "Theater Ballistic Missile Defense From the Sea, Issues for the Maritime Component Commander" (Newport, RI: U.S. Naval War College, August 1998), 43. CDR Swicker claims that only about 180 cells on four DDGs and two CGs will be available to carry Tomahawk missiles. The remaining over 400 VLS cells will be allotted to Theater Ballistic Missile Defense (TBMD) and air warfare in the "Aegis rich" CVBG of 2005+.

before deployment to best support the operational commander's intended use of the SSGN. When truly integrated into the joint battle, the NTACMS launched from the SSGN could assist air, land, amphibious, or special operations forces. However, while providing fire support, the SSGN will be unable to accomplish other submarine functions. Much like any surface combatant assigned the task of Naval Surface Fire Support (NSFS), the SSGN will need to patrol close to shore to maximize the reach of the short range NTACMS while continually monitoring for calls for fire. The Joint Task Force Commander (JFC) and component commanders will need to coordinate the SSGN fires in time, space and with other forces to produce a synergistic product.

Finally, the commander must consider the ability to support forced entry scenarios employing the SSGN's Special Operations Forces (SOF) insertion and extraction capabilities. Before and during hostilities, SOF are vital to the ability to covertly conduct operations ashore, gather intelligence, and prepare landing areas. With the new ASDS mini-submersible, the SSGN will provide the means of inserting as many as 100 SEALs, which is ten times the capacity of the SSN.¹² The SSGN's covertness and exceptional capacity will enable SOF to conduct more intense operational fire as well as deception fire missions. Here again, the SSGN exemplifies the submarine force shift to joint supportive roles requiring the JFC's attention.

The JFC could decide to employ the SSGN in roles and missions closely resembling those assigned to the nuclear fast attack submarine (SSN). However, because the SSGN will inherit the Trident SSBN sensors and systems, strict SSN-type operations conflict with its design. SSBN sensors and systems are not tailored to the traditional roles of reconnaissance,

¹² "Forward...From Under the Sea."

surveillance, approach and attack as are the SSN's. Also, equipped with below par surveillance equipment and lacking active sonar, employing the SSGN most effectively in hostile littoral waters will require matching capability with mission. While modifications could improve these sensors, it is more logical to accept that the SSGN will be the second choice asset for missions such as Under Sea Warfare (USW) or Intelligence and Warning (I&W).

Organization

The ability to execute any one of these missions, either sequentially or nearly simultaneously, will depend upon the skill of the crew and the planning and coordination provided by the operational commander. The typical organizational structure used to plan and coordinate submarine operations requires changes to employ the SSGN effectively in a joint warfare role.

Operational control (OPCON) is the ability to direct "all aspects of military operations and joint training necessary to accomplish missions."¹³ For submarines, OPCON has historically resided with the submarine operating authority (SUBOPAUTH). During the Cold War, the SSN functioned mostly autonomously when deployed. However, the need to fight jointly has influenced the submarine force during the past decade. With the advent of the Los Angeles class SSN the submarine force was able to join efforts with the high speed surface component of the navy in the form of the carrier battle group (CVBG). Current practice is to attach two SSN's to every CVBG to provide about 20 Tomahawks, an enhanced USW screen, SUW, and I&W roles through all work-up exercises and deployment. Even in this role, the

SSN is not truly an integral part of the CVBG. The submarine still functions autonomously throughout much of a deployment because of its operating characteristics, often submerged below communications depth, or tasked with surveillance where transmission would risk detection.¹⁴

To effectively employ the weapons of the assigned SSN and prevent local 'blue-on-blue' engagements, naval doctrine dictates that the SUBOPAUTH should delegate tactical control (TACON) to the CVBG Officer in Tactical Control (OTC) or designated subordinate commander.¹⁵ TACON is commonly delegated to the Undersea Warfare Commander (USWC) who is designated as the Submarine Operations Coordinating Authority (SOCA). SOCA controls local movement of the attached submarines for accomplishing tasks assigned by the OTC. To coordinate the submarine's tasking and movements, the OTC establishes a Submarine Element Coordinator (SEC) and Action Team (SAT) as part of the staff. During recent joint tactical employment, such as the Tomahawk strikes during Desert Storm, the SSN remained under the control of SOCA. The Maritime Component Commander was given a target list who then assigned the missions to the CVBG's Strike Warfare Commander (STC). The STC then coordinated the launch areas, known as launch baskets, for all the CVBG ships with the Joint Forces Air Component Commander (JFACC).

Carrying nearly the same number of Tomahawks as the CVBG, the JFC could employ the SSGN independently of the CVBG. Likewise, in a fire support role, the JFC's staff will need doctrine and experience when calling on the SSGN to employ the NTACMS. Further,

¹³ Joint Chiefs of Staff, Unified Action Armed Forces (UNAFF) (Joint Pub 0-2) (Washington, D.C.: 24 February 1995), III-8.

¹⁴ Holland, William J., Rear Admiral, USN, "Subs Slip Through the Net" U.S. Naval Institute Proceedings, June 1998, 29.

¹⁵ Chief of Naval Operations, "Coordinated Submarine/Task Group Operations Manual" (NWP 3-21.0) (Washington, D.C.: 1996), I-2.

the SSGN will need a means to coordinate fires *laterally* with land forces.¹⁶ This coordination will undoubtedly flow *vertically* to the operational commander's staff, a control path not yet clearly defined.

In the spirit of "Joint Vision 2010" and "Forward...From the Sea," institutionally and organizationally, future operations will be fully joint.¹⁷ In addition, using doctrine that reflects the best method of employment of forces will aid in the seamless integration of those forces. To integrate the SSGN into the joint fold requires a change in the organizational structure. The first option to consider is SUBOPAUTH transferring OPCON to the JFC. After all, joint doctrine requires the JFC assume OPCON for all assigned units.¹⁸ To take OPCON, the JFC must be ready to control water assignments to all submarines in theater and control the submarine broadcast. Neither task is overwhelming as long as a knowledgeable staff and the proper equipment is available.

If the JFC were to assume OPCON, TACON of the SSGN should then be delegated to the Joint Forces Maritime Component Commander (JFMCC). Afloat, the JFMCC will normally have a liaison and submarine cell to support submarine operations within the CVBG. However, when ashore, the JFMCC will need to be supported with a submarine cell staffed by the SUBOPAUTH. Lateral coordination for fire support would then flow from the JFMCC through the Joint Forces Land Component Commander (JFLCC).

By assuming OPCON, the JFC will control all submarines in theater, possibly overburdening the staff and duplicating SUBOPAUTH's efforts. Therefore, a second option is the transfer of only TACON of the SSGN to the JFC. The submarine cell for this option would be much smaller than the one needed for OPCON. Shifting TACON of the SSGN to the JFC

¹⁶ Jim Clemson CDR, USN. COMSUBPAC Staff. Telephone conversation with author, 9 December 1998.

will enhance the *Speed of Command* and *Self-Synchronization*. Speed and synchronization result from direct tasking to the supporting unit, the SSGN. However, with only TACON, the JFC will not be able to move the submarine throughout his entire theater, but only in the locally assigned water granted by the SUBOPAUTH. Further, a point of doctrinal contention arises. For NWP 3-21.0 states that TACON will only shift to an "afloat commander."¹⁹ The submarine force, working with the warfighting CINCS, needs to resolve the organizational structure that will best support the seamless transition of control of the SSGN to an ashore JFC or JFMCC.

In all cases, to interface between the JTF component commanders, the SSGN and the supported ground forces, the submarine force must provide a liaison staff. However, there is no submarine cell specifically designated for assignment to a JTF staff or serving on any of the CINC staffs. This reinforces the statement that the "techniques and processes involved with submarine operations as part of a task force are done so seldom that little experience exists within the command hierarchy."²⁰ The SSGN will require the development of explicit instructions and a cell of personnel experienced in joint operations to incorporate the SSGN into the JTF. COMSUBPAC is developing the concept of a "Super SEC" to 'fly-away' and become the JTF cell for assigned submarines.²¹ The 'Super SEC' will provide a cadre of experts to smooth-over the command-and-control and communications difficulties. The 'Super SEC' could then interface with the other component commanders to apply the SSGN power best in theater. Concurrently, if TACON were to shift to a shore unit, the cell or a liaison part of the cell could also shift to that unit.

¹⁷ Joint Chiefs of Staff, Joint Vision 2010 (Washington, D.C.: 1996), 8.

¹⁸ Joint Pub 0-2, III-9.

¹⁹ NWP 3-21.0, I-2.

²⁰ Holland, 30.

Command and Control

Command and control (C2) refers to both the process of “planning, directing, coordinating and controlling of forces and operations,” as well as the system of “personnel, equipment, communications, facilities and procedures employed by the commander.”²² Given that changes will occur to integrate the SSGN fully into the joint arena, further difficulties are conceivable within the C2 process of the operational commander’s staff that must be resolved through changes in doctrine.

The first command and control issue that will obviously occupy some of the joint staff effort is positioning the SSGN in theater. The optimum position for SOF insertion may not coincide with that for operational fires. Likewise, neither position may be suitable for submerged operations (or available if other submarines are assigned to the same area). This emphasizes the need for the component commanders on the joint staff to resolve positioning the SSGN for optimum employment, especially as the conflict becomes more complex and the SSGN’s tasking dictates simultaneous missions that may be mutually exclusive. It also illuminates the requirement for the operational commander to have experts in submarine employment available for liaison within the JFC’s staff. Finally, following a forced entry or during a land campaign, the Maritime Component Commander may not be able to resolve positioning conflicts without considering the desires of the other component commanders.

In contrast to the Battle Group Commander who would station a submarine where it could directly support of the battle group, the JFC will need to a change the paradigm to station the SSGN where it best supports joint forces. The Joint Forces Air Component

²¹ Jim Clemson CDR, USN. COMSUBPAC Staff. Telephone conversation with author. 9 December 1998.

²² Department of the Navy, Naval Command and Control (Naval Doctrine Publication 6) (Washington, D.C.: 19 May 1995), 6.

Commander (JFACC) would likely recommend stationing the SSGN far away from the aircraft carrier(s) to aid in deconflicting airspace. The Land Component Commander would fully support the JFACC as long as the SSGN would be in range to protect his forces in the littoral area. Further, the JFACC will most likely need to coordinate the assigned Tomahawk launch baskets to overlap the requirements of the JFLCC. The JFACC, JFLCC, and JFMCC must ensure that a comprehensive, cooperative comparison of mission characteristics and operational objectives meets the JFC's intention and the technical capabilities of the SSGN when deciding the positioning of the SSGN.

In making this decision, the JFMCC will also need to consider the SSGN's vulnerability to counterattack by enemy USW assets. While operating at periscope depth for extended periods when close to land providing fire support, the SSGN will have to expose multiple antennas to copy and pass vital traffic to maintain a common tactical picture. This will undoubtedly increase the visual and radar detection opportunities by a hostile force. Another vulnerability will be the plume of smoke from each missile launch as the SSGN responds to a call for fire. In this case, the JFC may have to move the SSGN into an umbrella formed by friendly air assets. Further, operating for extended periods at periscope depth will reduce the SSGN's ability to search and defend itself against a submerged threat. Inability to go to the best search depth and move away from the noisy littoral environment while providing fire support will limit the SSGN's self-defense capabilities. Just as Soviet doctrine required frequent delousing of its SSBNs in a bastion type defense to protect the SSBN, the JFMCC should coordinate the available SSN assets to protect the SSGN. This will clearly change the operational employment of the submarine.

Communications

Closely related, and sometimes intertwined with command and control, is the difficulty of communications with the submarine. Without continuous high-speed, two-way communications, the JFC will struggle to “fully exploit the special attributes” that submarines might provide the JTF in a rapidly changing land force situation.²³ The communication obstacle haunts the entire submarine force and will particularly limit the SSGN. Too few low data rate satellite circuits, and limited antenna size make all submarine command, control and communications arrangements deficient.²⁴ Moreover, like any other Tomahawk shooter, the SSGN must rely on targeting via Mission Data Updates (MDU's) from non-organic sensors. However, unlike the other shooters, antenna size limits the SSGN download rate and ability to shift missions. This deficiency will also restrict fire support using the NTACMS. Further, there exists an obvious dilemma formed by the need to link with other platforms and form “the synergistic effect” of Network-Centric Warfare and the potential of compromising stealth.²⁵

A small investment in today's communications technology will allow the operational commander to overcome some of these difficulties. A \$10 million contract awarded to Raytheon in 1998 will bridge this communications gap by taking advantage of Extremely High Frequency (EHF). This contract will install upgrades for higher data rate transmissions on all ships, including submarines, which should equal the capabilities of other naval components.²⁶ However, increasing the speed of communications does not solve all

²³ James H. Patton, Jr. Captain, USN, “The Submarine Connectivity Issue, What to Do?” Naval Submarine League Submarine Review, July 1998, 80.

²⁴ Holland, 29.

²⁵ Patton, 75.

²⁶ Shea, Dave, “Raytheon to Upgrade Navy EHF Satellite Communications Program” 17 June 1998, <<http://www.seiscor.com/press/1998/jun/nsep.html>> (13 Dec 98).

interoperability obstacles. To improve joint interoperability, the Situational Awareness Beacon with Reply (SABER) may make network centric warfare a reality for 'disadvantaged' antenna platforms such as the submarine. SABER uses "UHF SATCOM to build three-dimensional networks of war fighters."²⁷ SABER will provide the ability to communicate with the ground troops supported by NSFS and will be essential to integrate the SSGN into the joint arena.

Other arguments have been posed that because operating patterns are not well understood outside the submarine community, the task force will not be able to realize the full potential of the SSGN. RADM Holland, retired US submariner and current president of the Armed Forces Communications and Electronics Association Education Foundation, claims that:

"This large patrol area and lack of regular communication creates an ambiguity with which task force commanders rarely are comfortable. Even the most daring commanders acknowledge that they like to hear from submarines now and then, just to reassure themselves that the submarines are there."²⁸

The need to overcome unfamiliarity with submarine operating patterns reinforces the call for the inclusion of a submarine liaison on the JFC's staff. Until continuous high-speed, two-way communications between the operational commander and submarine are possible the liaison cell will manage prioritization of message traffic as well as convey the anticipated reaction time to the JFC. Reaction time for a Tomahawk strike, for example, must account for the time needed for the SSGN shift missions. The liaison will base the time needed on the

²⁷ Boyd, Austin, Commander, USN, "NSC--Heart of the War Beast"
<<http://www.navspace.navy.mil/news/centric.htm>> (12 Dec 98).

²⁸ Holland, 30.

next expected time for the SSGN to arrive at communications depth, the time needed to reprogram missiles as well as time required to relocate the ship for launch. Fleet Battle Experiments and Joint Fleet Exercises will determine interoperability and the best means of communication with this new asset. The key is that these difficulties can be overcome using today's technology and an experienced liaison cell.

Recommendations

Several courses of action should be taken now to prepare the operational commander and the submarine force for the inevitable shift to submarine power projection ashore from the littorals.

1. The Chief of Naval Operations (OPNAV) N87, must direct the Atlantic and Pacific Submarine Force to establish a 'Super SEC' now. This submarine cell will be required to manage water space assignments, communications issues and form a synergy between the component commanders, the SSGN and the forces it supports. Establishing this liaison cell will also breed familiarity with submarine operations within the operational commander's staff.

2. OPNAV in conjunction with the Naval Warfare Doctrine Command (NWDC) must sponsor war games to develop the operational concepts of the SSGN. These war games should determine the best method of control of the SSGN as well as exercise the 'Super SEC' concept. As a result, these war games will determine the best composition of the 'Super SEC' and NWDC should incorporate lessons learned into new naval and joint doctrine. This doctrine should precede deployment of the SSGN to best harness the power of this new platform. Further, because of the unfamiliarity with submarine operations, this doctrine will

provide guidelines and explicit instructions for those on the fringes who will have the least experience....”²⁹

3. Finally, the warfighting CINCs must test the recommended operational concepts of the SSGN in Joint Fleet Exercises keeping in mind that the recommended employment in one theater may differ drastically from that in another. The last known battle experiment to incorporate the arsenal ship concept occurred in 1997. Because the SSGN poses new and different limitations on the commander, these experiments should test the command and control process recommended from war gaming. These exercises will also allow the operational commander to ensure interoperability of all assets in theater. In the near future, ACOM will have established the first Joint Training Command.³⁰ This command should specifically be tasked with directing the JFC to practice and understand the process of integration of the different platforms, including the SSGN.

Conclusion

Once the Russian Duma ratifies the START II treaty, the SSGN will quickly appear in the fleet. Although able to function under a Task Group Commander, its real mission should be in support of the Joint Task Force. The SSGN will project power ashore using operational fires combined with a large special forces contingent to prepare and shape the battlefield for the arrival of the more vulnerable forces under the operational commander. The real test will not be the development of the technology to build the SSGN, but will be the ability of the operational commander to correctly integrate and optimally plan the use of the SSGN in regional contingencies. To wait until the SSGN arrives in the fleet to experiment with

²⁹ Ibid., 30.

³⁰ Ron Mayer, ACOM Joint Experimentation Lab. Telephone conversation with author. 14 December 1998.

shifting control and planning operations wastes valuable time. Procedures must be developed and practiced today to reduce the risk to more vulnerable forces operating in a hostile littoral environment during the next theater conflict.

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